

# CLAIMS:

1. A control apparatus for controlling supply of voltage from the supply unit to the electrode of a DC electric welder for protecting a user of the electrode against electric shock when changing rods in the electrode, the apparatus

5 comprising:

an input terminal for connection to a the supply unit for receiving therefrom a DC current for supply to the electrode;

an output terminal for connection to the electrode for supplying the current from the supply unit to the electrode for powering the electrode during use;

10 a supply line connected between the input terminal and the output terminal;

an electronic current switch in the supply line operable to transmit or to not transmit the current from the input terminal to the output terminal;

15 a detector circuit arranged to detect the electrical resistance between the output terminal and ground;

and a control circuit arranged to actuate the switch to effect transmission of current only if the resistance detected is less than or equal to 120 ohms.

2. The control apparatus according to Claim 1 wherein the control  
20 circuit is arranged to actuate the switch to effect transmission of current only if the resistance detected is less than or equal to 40 ohms

3. The control apparatus according to Claim 1 wherein switch is an SCR thyristor having a gate which is triggered by the control circuit.

4. The control apparatus according to Claim 3 wherein the control circuit is arranged such that the gate of the thyristor is triggered only for a period of time and the gate is then not triggered during normal welding.

5. The control apparatus according to Claim 3 wherein the control  
5 circuit is arranged such that the gate is triggered for a period just long enough to complete an arc between the electrode and a workpiece.

6. The control apparatus according to Claim 3 wherein the control circuit is arranged such that the period is of the order of three seconds.

7. The control apparatus according to Claim 1 wherein the control  
10 circuit is arranged such that there is a delay before the switch is triggered.

8. The control apparatus according to Claim 7 wherein the control circuit is arranged such that the delay is of the order of 0.5 seconds.

9. The control apparatus according to Claim 1 wherein the control  
15 circuit includes a programmable micro-controller chip which allows the chip to be programmed to specific parameters.

10. The control apparatus according to Claim 1 wherein the control circuit includes a programmable micro-controller chip which allows the chip to automatically test all critical components in the control circuit and relate any fault information to the user.

20 11. The control apparatus according to Claim 1 wherein there are provided reverse polarity protection diodes on all connections from the control circuit to the supply line.

12. A control apparatus for controlling supply of voltage from the supply unit to the electrode of a DC electric welder for protecting a user of the electrode against electric shock when changing rods in the electrode, the apparatus comprising:

5 an input terminal for connection to a the supply unit for receiving therefrom a DC current for supply to the electrode;

an output terminal for connection to the electrode for supplying the current from the supply unit to the electrode for powering the electrode during use;

10 a supply line connected between the input terminal and the output terminal;

an SCR thyristor switch in the supply line operable to transmit or to not transmit the current from the input terminal to the output terminal;

a detector circuit arranged to detect the electrical resistance between the output terminal and ground;

15 and a control circuit arranged to actuate the SCR thyristor switch to effect transmission of current only if the resistance detected is less than a predetermined value;

20 wherein the control circuit is arranged such that the gate of the thyristor is triggered only for a period of time and the gate is then not triggered during normal welding.

13. The control apparatus according to Claim 12 wherein the control circuit is arranged such that the gate is triggered for a period just long enough to complete an arc between the electrode and a workpiece.

14. The control apparatus according to Claim 12 wherein the control circuit is arranged such that the period is of the order of three seconds.

15. The control apparatus according to Claim 12 wherein the control circuit is arranged such that there is a delay before the switch is triggered.

5 16. The control apparatus according to Claim 7 wherein the control circuit is arranged such that the delay is of the order of 0.5 seconds.

17. A control apparatus for controlling supply of voltage from the supply unit to the electrode of a DC electric welder for protecting a user of the electrode against electric shock when changing rods in the electrode, the apparatus  
10 comprising:

an input terminal for connection to a the supply unit for receiving therefrom a DC current for supply to the electrode;

an output terminal for connection to the electrode for supplying the current from the supply unit to the electrode for powering the electrode during use;

15 a supply line connected between the input terminal and the output terminal;

an electronic current switch in the supply line operable to transmit or to not transmit the current from the input terminal to the output terminal;

a detector circuit arranged to detect the electrical resistance between  
20 the output terminal and ground;

and a control circuit arranged to actuate the switch to effect transmission of current only if the resistance is less than a predetermined value;

wherein the control circuit includes a programmable micro-controller chip which allows the chip to be programmed to specific parameters.

18. The control apparatus according to Claim 17 wherein the chip is arranged to automatically test all critical components in the control circuit and relate  
5 any fault information to the user.

19. The control apparatus according to Claim 17 wherein there are provided reverse polarity protection diodes on all connections from the control circuit to the supply line.